UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

NATIONAL ASSOCIATION FOR THE ADVANCEMENT OF COLORED PEOPLE, SPRING VALLEY BRANCH; JULIO CLERVEAUX; CHEVON DOS REIS; ERIC GOODWIN; JOSE VITELIO GREGORIO; DOROTHY MILLER; HILLARY MOREAU; and WASHINGTON SANCHEZ, Plaintiffs, v. EAST RAMAPO CENTRAL SCHOOL DISTRICT and MARYELLEN ELIA, IN HER CAPACITY AS THE COMMISSIONER OF EDUCATION OF THE STATE OF NEW YORK, Defendants.	17 Civ. 8943 (CS) (JCM)

AFFIDAVIT OF DR. STEVEN P. COLE

A. Introduction and Qualifications

1. I have been retained by Latham & Watkins LLP and the New York Civil Liberties Union Foundation, counsel for Plaintiffs in the above-captioned litigation, to prepare an expert opinion regarding the existence and extent of racially-polarized voting in the East Ramapo Central School District ("East Ramapo" or the "District"), located in Rockland County, New York. My qualifications, including a list of all publications I have authored within the past 10 years and a listing of cases in which I have served as an expert or a consultant, are set forth in my curriculum vitae, a true and correct copy of which is attached hereto as Exhibit 1.

2. I am employed as Director of Research at Research Design Associates, Inc., a firm I co-founded in Yorktown Heights, New York. My responsibilities include research design

and implementation, and the use of statistical methods in data analysis. I have held the position of Director of Research since the firm's founding in 1982. I am currently an Adjunct Professor in the Department of Psychology at Emory University, and I have held this position since 1993. My teaching and research interests include statistics and quantitative methods, and research design. I received a B.A. in Psychology from the University of Virginia in 1969, an M.A. in Developmental Psychology from Columbia University in 1976, and a Ph.D. in Human Experimental Psychology from Emory University in 1985. Federal courts have accepted me as an expert in statistical methodology and the analysis of racially polarized voting in more than a dozen cases dating back to 1989. I am compensated for my work in this matter at the rate of $150 per hour.

B. Expert Reports

3. On December 7, 2017, I executed a declaration in support of Plaintiffs' Motion for a Preliminary Injunction that annexed as exhibits a copy of my curriculum vitae and a copy of my Preliminary Expert Report. A true and correct copy of my Preliminary Expert Report is attached hereto as Exhibit 2.

4. On March 14, 2018, I submitted a declaration annexing a copy of my Rebuttal Expert Report in this case, which supplemented my preliminary report concerning issues that arose during the course of my February 6, 2018 deposition and that were raised by the District's expert, Dr. John Alford, in his February 19, 2018 report. A true and correct copy of my Rebuttal Expert Report is attached hereto as Exhibit 3.

C. Further Analysis Based on Data Produced After Rebuttal

5. I have conducted further analysis in this case based on data that Dr. Alford produced nine days after I filed my Rebuttal Expert Report. On February 26, 2018, Plaintiffs

requested the data underlying Dr. Alford's report, including the data input into and output from the software package that Dr. Alford used to perform his ecological inference ("EI") analysis. After 5pm on Friday, March 23, 2018, I received raw input data (.dta files) that Dr. Alford used to generate his analysis. Without these .dta files, it was not possible to know exactly what data Dr. Alford used to generate his analysis or to derive the calculations undergirding his estimates of voting patterns by race, including turnout estimates by race. To date, I have not received the output data requested.

6. Having now had an opportunity to conduct analyses based on the data produced by Dr. Alford thus far, my overall conclusions remain the same as expressed in my Preliminary Report and my Rebuttal Report, namely that: (1) Black voters in East Ramapo are politically cohesive; (2) there is a politically cohesive coalition of Black and Latino voters in East Ramapo; (3) voting in East Ramapo is racially polarized such that the preferred candidates of minority voters are usually defeated by the preferred candidates of a large White voting bloc; (4) and minority-preferred candidates have generally not been elected to the Board.

D. Analysis of Dr. Alford's Data Provides Information About White Voter Turnout and White Voting Patterns That Can Be Used to Deduce Minority Voting Patterns

7. While my analysis of Dr. Alford's input data revealed no reason to reconsider my own conclusions, it did reveal a flaw in Dr. Alford's conclusions. In his report, Dr. Alford opines: "The wide confidence intervals associated with my EI estimates make it impossible to use the EI analysis to draw any conclusions relating to racially polarized voting." Alford Report ¶ 50. Specifically, Dr. Alford asserts that: "[O]ne cannot determine whether Blacks and Whites voted differently if one cannot determine how Black voters voted in the first place." Alford Report ¶ 50. However, based on Dr. Alford's input data, it *is* possible to determine whether

minorities and Whites voted differently by determining—as Dr. Alford has—how White voters voted in the first place.

8. To estimate racial voting patterns, an EI analysis must generate and rely upon estimations of voter turnout by race. When Dr. Alford's .dta files are entered into the software package that he uses, the software can generate the turnout estimates for White and minority voters upon which Dr. Alford's EI analysis relies. Those turnout estimates then can be applied to the official vote totals to estimate the total number of White votes cast in the election. Dr. Alford's own estimates of the distribution of White bloc voting can then be applied to the total number of White votes cast to determine the number of White votes cast for each candidate, which in turns allows us to estimate the number of minority votes cast for each candidate.

9. This analysis – using Dr. Alford's own .dta files and the software package that he uses – demonstrates that the winning candidates in every contest won the overwhelming majority of their votes from White voters—which means that they could not have won a majority of votes from minority voters. Instead, the most probable estimates of turnout and White voting patterns confirm that there are very high levels of polarization between White and minority voters in East Ramapo.

10. The relationship between a candidate's official vote totals, turnout by race, and estimated voting patterns by race is expressed through the following simple equation. For any election:

The total number of votes won by candidate =

(Total number of White voters x Percentage of White support for the candidate)

+

(Total number of minority voters x Percentage of Minority support for the candidate)

11. Here, the official election results provide the total number of votes cast for each candidate. Turnout estimates for White and minority voters can be derived through Dr. Alford's data and software. And Dr. Alford's report has already provided very stable estimates for the percentage of White voters supporting each candidate. The only remaining variable is the percentage of Minority support for each candidate in the elections at issue, which can be determined as a matter of simple arithmetic.

E. White and Minority Turnout Rates Can Be Derived from Dr. Alford's Data and Software

12. Estimated voter turnout rates for White and non-White voters can be calculated by running Dr. Alford's data through the same software package that he used for his EI analysis.[1] Given the short period of time available to analyze this data, I directed a colleague, Prof. Loren Collingwood,[2] who has access to Dr. Alford's software package, as well as experience and expertise with the software and programming language used in Dr. Alford's script, to run Dr. Alford's .dta files to generate voter turnout estimates for Whites and minority voters. Under my

[1] An authoritative instruction manual for generating the type of analysis that Dr. Alford describes how the software can be used to generate the turnout estimates for White and minority voters. *See* Gary King and Margaret Roberts, Ei: a (n r) program for ecological inference. Harvard University, Feb 1, 2012, http://gking.harvard.edu/files/ei.pdf (last visited March 26, 2018).

[2] Prof. Collingwood is an Assistant Professor of Political Science at the University of California-Riverside. Prof. Collingwood was compensated at a rate of $300 per hour for his time. The script that Prof. Collingwood used to generate the turnout estimates rates by race undergirding Dr. Alford's analysis is reproduced as Figure 1 at the end of this affidavit.

direction, Prof. Collingwood was able to generate those turnout estimates by using the same command structure as Dr. Alford, changing only the dependent variable—that is, the value to be measured—so as to estimate turnout rate rather than candidate vote choice.

13. Dr. Alford's analysis indicates that the point estimates for White and minority turnout are both very stable. Dr. Alford's approach to EI (known as a "rows by columns" approach or "RxC") is implemented via Bayesian simulation, a process known as Markov Chain Monte Carlo (MCMC). Each iteration of the MCMC process samples model parameters, in this case voter turnout and candidate vote by racial group. This produces a posterior distribution of each parameter of interest (i.e., white turnout). The distribution's mean becomes the point estimate and confidence intervals are generated by only the 2.5 percent of draws on either tail of the distribution. Looking at Dr. Alford's original script, he instructed his software to run 100,000 iterations. If we took his data in script and ran another 100,000 iterations right now, it would almost certainly result in 86% White vote for Berkowitz in that particular election. This means across 100,000 MCMC iterations, the point estimates for White voting turnout and share of support for each candidate are quite stable. As a logical matter, because the vote totals are finite and candidates can only receive votes from White or minority voters, we can also infer that the point estimate for minority turnout rate is also very stable.

14. The point estimates—that is, the estimates that are most probable among all possibilities—for turnout rates generated by Dr. Alford's software for White and minority voters in 2013, 2015, 2016, and 2017 are reflected in Table 1 below. These estimated turnout rates show that in each year, White turnout as a percentage of citizen voting age population (CVAP) substantially exceeds minority turnout as a percentage of CVAP. This means that for each election analyzed, White voters, who already make up approximately 60% of the District's total

CVAP, cast the vast majority of votes in each election. These point estimates are consistent with observed turnout rates for each of these contests for the polling places that have the highest White and minority CVAP in the District.

Table 1: Estimated Turnout Rates as a Percentage of CVAP for White and Minority Voters

Year	White Turnout (% of CVAP)	Minority Turnout (%CVAP)
2017	28.59%	15.20%
2016	24.64%	12.77%
2015	21.82%	14.40%
2013	22.40%	16.02%

15. In Table 2, the point estimates for White turnout are shown to be consistent with the actual observed turnout at the three polling places that have over 90% White CVAP—Kakiat, Ramapo, and Lime Kiln.

Table 2: Point Estimates for White Turnout and Observed White Turnout

Year	Est. White Turnout	Kakiat	Ramapo	Lime Kiln
2017	28.59%	38.45%	27.72%	25.65%
2016	24.64%	31.24%	25.79%	27.47%
2015	21.82%	30.00%	20.83%	21.13%
2013	22.40%	28.96%	21.94%	21.96%

16. In Table 3, the point estimates are shown to be consistent with observed turnout at the two polling places with the highest percentages of minority CVAP—Kurtz Center, which has 77% minority CVAP, and Hempstead, which has 69% minority CVAP. No other polling places have minority CVAP over 50% and so Kurtz Center and Hempstead are the only polling places that can reflect the influence of a predominantly minority CVAP on turnout rates.

Table 3: Point Estimates for Minority Turnout and Observed Minority Turnout

Year	Est. Minority Turnout	Kurtz Center	Hempstead
2017	15.20%	11.78%	14.63%
2016	12.77%	8.87%	14.32%
2015	14.40%	11.09%	13.92%
2013	16.02%	13.26%	16.34%

F. Dr. Alford Has Reported Stable Estimates Of High Levels of White Voter Cohesion

17. After having determined the candidate vote totals from official election results and the turnout rates as described above, the remaining data needed to determine the share of minority votes won by each candidate is the share of White votes won by each candidate. Dr. Alford has already reported estimates of White voter support for each candidate. Alford Report ¶ 42 (Table). Dr. Alford's point estimates—that is, the most probable or best estimates—show that the winning candidate for every Board election analyzed received at least 78% and as much as 87% of all White votes. Furthermore, the 95% confidence intervals that Dr. Alford generates show that his estimates of high levels of White bloc voting are very stable—the lowest bound of any of these confidence intervals shows that it is highly unlikely that White support for winning candidates ever falls below 65% of all White votes. Alford Report ¶ 42 (Table).

18. Dr. Alford's stable estimates of White bloc voting, combined with the turnout estimates derived from his input data, provide a basis for determining how many votes each candidate received from White voters. The allocation of the remaining votes, *i.e.*, how many votes each candidate received from non-White voters, can be calculated simply by subtracting the number of White votes from the overall number of votes cast for a specific candidate. When this analysis is done, it confirms that minorities are cohesive and voting for candidates who are usually defeated by a White majority bloc.

G. An Example from the 2017 Election Shows How Minority Support for Candidates Can Be Derived from Dr. Alford's Reported White Voting Patterns, Estimate Turnout Rates, and Vote Totals.

19. The contest from the election that appears in the "Script for EI Analysis" that Dr. Alford reports, i.e., the 2017 contest between Mark Berkowitz and Alexandria Manigo for the seat of Moshe Hopstein, illustrates that Berkowitz received so many White votes that it is highly unlikely that he received more than a small fraction of minority votes. *See* Alford Report at A-17 (referencing Results\\ Trustee2017_seatofHopstein _results.dta)).

20. Determining the numbers and shares of minority votes cast for Berkowitz can be determined through the equation below:

The total number of votes won by Berkowitz =

(Total number of White voters x Percentage of White support for Berkowitz)
+
(Total number of minority voters x Percentage of Minority support for Berkowitz)

21. Applying the methodology described above yields the following:

a. Election results show that the total number of actual votes won by Berkowitz is 9,158 votes.

b. Dr. Alford reports a point estimate of 86% for the share of White voters who voted for Berkowitz. This point estimate of 86% is considered the "best" estimate or the estimate most likely to reflect the true voting results.

c. The estimated number of votes cast by White voters in the 2017 election can be derived from Dr. Alford's .dta files, script, and software package. White and minority turnout may be calculated as follows: Running Dr. Alford's .dta file through his software package generates an estimated White voter turnout rate of 28.59% for 2017 and an estimated minority voter turnout rate of 15.20% (*i.e.*, 28.59% of voting-eligible Whites turned out to vote,

compared to 15.20% of voting-eligible non-Whites). These rates can then be multiplied, respectively, by the total White CVAP and total minority CVAP to yield total turnout figures. The Census data that Dr. Alford and I both relied upon estimated that White CVAP for the District was 36,472, which means that there were approximately 10,427 (28.59% * 36,472) White votes cast in this election, equivalent to 74.2% of all votes cast. The Census data also show that minority CVAP is 23,851, which means that approximately 3,648 (15.20% * 23,851) minority votes were cast in this election, or 25.8% of all votes cast. Table 4 below reflects the application of turnout estimates derived from Dr. Alford's data and software to Census data to determine the share of votes cast by Whites and minorities in the 2017 Board contests.[3]

Table 4: Turnout Estimates and Share of Total Votes by Race Generated from Dr. Alford's .dta Files and Software

	Turnout	CVAP	Votes	Share
White	0.2859	36,472	10,427	0.742017347
Non-White	0.1520	23,851	3,625	0.257982653
Total	0.2330	60,323	14,053	1.00
Actual	0.2344	60,323	14,139	

22. Having determined that Whites cast 74.2% of all votes in the 2017 election, the result is that out of an actual total of 14,139 votes—10,491 are White votes and 3,648 are minority votes.

23. Applying Dr. Alford's point estimate of 86% White voter support for Berkowitz to the total number of White voters, I determined that Berkowitz received 9,023 votes from

[3] This analysis of turnout estimates and Census data results in an estimate of 14,053 total votes cast, which is within 86 votes, or 0.6%, of the actual vote total of 14,139 votes. This level of precision offers greater confidence in these estimates. These negligible discrepancies are likely due to the Census Bureau's CVAP figures being calculated as a 5-year average, rather than a hard count for each year.

Whites. We know from reported election results that Berkowitz received a total of 9,158 votes. Berkowitz's White vote total leaves him 135 votes short of his observed total. Therefore, he must have received 135 non-white votes. Further, because Dr. Alford's turnout estimates and Census data allowed me to calculate that 3,648 minority votes were cast in this election and only 135 of those went to Berkowitz, I am then able to determine that Manigo won 3,495—or an estimated 96% of minority votes, compared to Berkowitz's 4% of minority votes. These calculations are illustrated in Table 5 below in terms of both vote totals and vote share.

Table 5: Vote Totals and Vote Share at Dr. Alford's Point Estimate of White Voter Support for Berkowitz (86%) and Manigo (14%)[4]

	Alford White Share	Total White Voters	White Votes for Candidate	Est. Minority Share	Total Minority Voters	Minority Votes for Candidates	Actual Vote Total
Berkowitz	0.86	10,491	9,023	0.04	3,648	135	9,158
Manigo	0.14	10,491	1,469	0.96	3,648	3,495	4,964

24. Even when applying the White vote shares at the outer bounds of Dr. Alford's confidence intervals—95% and 75%—it is clear that Berkowitz was able to win the 2017 election with very little minority support. Furthermore, in contrast to the point estimate, which reflects the best estimate of White vote shares, the probability that the estimates at either end of the confidence interval reflect that the true White vote share in this election is very low.

25. When I apply the same calculations as above to the upper bound estimate, the result is a statistical impossibility. If Berkowitz won 95% of the White vote, then based on the turnout rate, he would have exceeded his actual vote total by 809 votes. Under those

[4] The difference of 17 votes between Berkowitz and Manigo's combined vote totals (4,122) and the total number of ballots cast in the election (4,139) is attribute to the total number of write-in votes cast. At least some write-in votes were cast in all 12 contests analyzed.

circumstances, Manigo could have won every single minority vote and still fallen short of her actual vote total by 809 votes. These calculations are reflected in Table 6 below.

Table 6: Vote Totals and Vote Share at the Upper Bound of Dr. Alford's Confidence Interval for White Voter Support for Berkowitz (95%) and Manigo (5%)

	Alford White Share	Total White Voters	White Votes for Candidate	Est. Minority Share	Total Minority Voters	Minority Votes for Candidates	Actual Vote Total
Berkowitz	0.95	10,491	9,967	-0.22	3,648	(809)	9,158
Manigo	0.05	10,491	525	1.22	3,648	4,439	4,964

26. The lower bound of Dr. Alford's confidence interval yields results that may appear more plausible, but statistically, they are as equally improbable as his upper bound estimates. According to Dr. Alford, the bare minimum share of White votes that Berkowitz could have received is 75% or 7,869 White votes. At that rate, the maximum number of minority votes that Berkowitz could have won is 1,289 (actual vote total he received minus the White votes). This result means that under any circumstances falling within the range of possibilities presented by Dr. Alford, Manigo could not have won fewer than 2,341 minority votes—or nearly twice the number of minority votes than Berkowitz. These calculations are reflected in Table 7 below.

Table 7: Vote Totals and Vote Share at the Lower Bound of Dr. Alford's Confidence Interval for White Voter Support for Berkowitz (75%) and Manigo (25%)

	Alford White Share	Total White Voters	White Votes for Candidate	Est. Minority Share	Total Minority Voters	Minority Votes for Candidates	Actual Vote Total
Berkowitz	0.75	10,491	7,869	0.35	3,648	1,289	9,158
Manigo	0.25	10,491	2,623	0.64	3,648	2,341	4,964

27. Yet looking at this analysis when applying Dr. Alford's point estimate for the amount of White voter support received by Berkowitz and Manigo, the high degree of racial polarization is generally consistent with the point estimates and confidence intervals that I

calculated for this race and the other two 2017 contests. Ex. 3, Table 3. Based on this analysis, which shows that Berkowitz likely received approximately 135 out of 3,648 minority votes, I have a very high level of confidence in my conclusion that Manigo was the preferred candidate of both Black and Latino voters in this contest.

H. Applying the Same Analysis to Every Board Contest Shows Consistent and High Levels of Racially Polarized Voting

28. I repeated this method of generating minority vote totals and shares for each candidate in all 12 Board contests analyzed, using the estimates of White and minority turnout as a percentage of CVAP that Prof. Collingwood generated for each election year using Dr. Alford's .dta files, software, and script. The calculations of White and minority support for each candidate in every contest based on Dr. Alford's point estimates as well as the lower bounds of his confidence intervals are reproduced toward the end of this report at Tables 10 and 11, respectively. Dr. Alford's stable estimates of high levels of White bloc voting and the best estimates for turnout rates derived from his analysis demonstrate that in every single contest, the winning candidates received such a large share of their vote totals from White voters, that it is highly unlikely—as a purely mathematical matter—that they received a substantial number of minority votes. These calculations demonstrate that even at the lower bound of Dr. Alford's confidence intervals for White voting behavior, the losing candidates received the majority of minority votes in all 12 contested Board elections since 2013.

29. The extreme extent of racially polarized voting in the District becomes even more clear when the data are analyzed through the lens of Dr. Alford's point estimates for White bloc voting. To illustrate this, in Table 8 below, I show the minority vote share for each candidate based on (a) the lower bound of Dr. Alford's confidence intervals for White bloc voting; and (b) Dr. Alford's point estimate for White bloc voting. *See* Alford Report ¶ 42 (Table).

Table 8: Candidate Shares of White and Minority Votes Based the Lower Bounds and Point Estimates for White Vote Share Reported at Alford Report ¶ 42

2017

Candidate name (* = winner)	***White*** Vote Share at Alford CI Lower Bound	***Minority*** Vote Share at CI Lower Bound	***White*** Vote Share at Alford Point Estimate	***Minority*** Vote Share at Point Estimate
Berkowitz*	75%	36%	86%	4%
Manigo	25%	64%	14%	96%
Grossman*	75%	36%	86%	6%
Goodwin	25%	64%	14%	94%
Freilich*	77%	42%	87%	13%
Dos Reis	23%	58%	13%	87%

2016

Candidate name (* = winner)	***White*** Vote Share at Alford CI Lower Bound	***Minority*** Vote Share at CI Lower Bound	***White*** Vote Share at Alford Point Estimate	***Minority*** Vote Share at Point Estimate
Charles*	74%	45%	85%	13%
Foskew	26%	55%	15%	87%
Germain*	74%	41%	85%	9%
Fields	26%	60%	15%	92%
Weissmandl*	73%	37%	84%	4%
Morales	27%	66%	16%	98%

2015

Candidate name (* = winner)	***White*** Vote Share at Alford CI Lower Bound	***Minority*** Vote Share at CI Lower Bound	***White*** Vote Share at Alford Point Estimate	***Minority*** Vote Share at Point Estimate
Lefkowitz*	70%	22%	82%	>0%
Charles-Pierre	29%	66%	16%	96%
Jones	3%	7%	1%	11%
Rothman*	69%	28%	82%	0%
Morales	31%	72%	18%	100%
Ramirez*	65%	34%	78%	1%
White	30%	63%	17%	94%
Eisenbach	6%	<0%	6%	2%

2013

Candidate name (* = winner)	***White*** Vote Share at Alford CI Lower Bound	***Minority*** Vote Share at CI Lower Bound	***White*** Vote Share at Alford Point Estimate	***Minority*** Vote Share at Point Estimate
Corado*	67%	34%	84%	>0%
Tuck	33%	66%	17%	100%
Germain*	67%	36%	80%	8%
Clerveaux	33%	62%	20%	89%
Charles*	66%	37%	80%	7%
Forrest	34%	62%	20%	92%

30. The vote shares derived from Dr. Alford's analysis of the 2013 election are particularly notable because they demonstrate that it is highly unlikely that Corado, Tuck, and Germain—the preferred candidates of White voters—were also the preferred candidates of minority voters. As I wrote in my Preliminary Report, it is my opinion that the EI results that I generated for Black vote share in the 2013 election were not conclusive of which candidates were Black-preferred candidates. I came to that opinion based on inconsistencies between my EI

and my correlation analysis and homogenous precinct analysis (HPA), which I validated with qualitative data. Among other things, when viewed in light of the relatively close vote totals for the 2013 election and the high levels of White cohesion that I calculated using EI and HPA, it is highly unlikely that the losing candidates could have received approximately 43% of the total vote while losing both the White and Black vote by margins greater than 30%. The results derived from Dr. Alford's own EI data further validate that opinion. The shares of non-White voting support derived from Dr. Alford's analysis for the 2013 election support a conclusion that Pierre Germain, Bernard Charles, and Maraluz Corado were very likely *not* the preferred candidates of minority voters in that election.

31. As noted in my Rebuttal Expert Report, both my analysis and Dr. Alford's report clearly demonstrate that the preferred candidates of a very large bloc of White voters have won every Board election analyzed.

32. The results discussed here, which I derived from an analysis of Dr. Alford's own data run through his own software package, are consistent with my EI analysis, correlation analysis, and homogenous precinct analysis for the last nine Board contests. Together, these analyses have led me to conclude that in at least the last nine Board contests, the preferred candidate of Black voters and a cohesive coalition of Black and Latino voters have been defeated by the preferred candidate of a large bloc of White votes.

33. Table 9 shows the point estimates of turnout rate derived from Dr. Alford's analysis with shares of total votes for White and minority votes for each year in which there were contested Board elections.

Table 9: **Point Estimates of Turnout Rate with Shares of Total Votes for White and Minority Voters for All Years with Contested Board Elections, 2013-2017**

2017	**Turnout**	**CVAP**	**Votes**	**Share**
White	0.2589	36,472	10,427	0.742
Non-White	0.1520	23,851	3,625	0.257
2016	**Turnout**	**CVAP**	**Votes**	**Share**
White	0.2464	36,472	8,987	0.747
Non-White	0.1277	23,851	3,046	0.253
2015	**Turnout**	**CVAP**	**Votes**	**Share**
White	0.2182	36,472	7,958	0.699
Non-White	0.1440	23,851	3,435	0.031
2013	**Turnout**	**CVAP**	**Votes**	**Share**
White	0.2240	36,472	8,170	0.681
Non-White	0.1602	23,851	3,821	0.319

34. Table 10 shows the vote totals and vote shares by race calculated for each candidate in every Board contest analyzed, using the point estimate for shares of white voter support reported in paragraph 42 of Dr. Alford's report. The total number of White voters and minority voters for each year are derived from Table 9 above.

Table 10: **Vote Totals and Vote Share at the Dr. Alford's Point Estimate for White Voter Support for All Candidates in Contested Elections, 2013-2017**

2017	Alford White Share	White Votes for Candidate	Est. Minority Share	Minority Votes for Candidate	Actual Vote Total
Berkowitz	0.86	9,023	0.04	135	9,158
Manigo	0.14	1,469	0.96	3,495	4,964
Grossman	0.86	9,023	0.03	114	9,137
Goodwin	0.14	1,469	0.94	3,441	4,910
Freilich	0.87	9,128	0.11	402	9,530
Dos Reis	0.13	1,364	0.86	3,139	4,503
2016	**Alford White Share**	**White Votes for Candidate**	**Est. Minority Share**	**Minority Votes for Candidate**	**Actual Vote Total**
Charles	0.85	7,588	0.13	385	7,973
Foskew	0.15	1,339	0.87	2,633	3,972
Germain	0.85	7,588	0.09	272	7,860
Fields	0.15	1,339	0.92	2,798	4,137
Weissmandl	0.84	7,499	0.04	127	7,626
Morales	0.16	1,428	0.98	2,973	4,401
2015	**Alford White Share**	**White Votes for Candidate**	**Est. Minority Share**	**Minority Votes for Candidate**	**Actual Vote Total**
Lefkowitz	0.82	6,573	-0.06	(193)	6,380
Charles-Pierre	0.16	1,283	0.96	3,317	4,600
Jones	0.01	80	0.11	388	468
Rothman	0.82	6,528	0.00	(5)	6,523
Morales	0.18	1,433	1.00	3,431	4,864
Ramirez	0.78	6,252	0.01	41	6,293
White	0.17	1,363	0.94	3,252	4,615
Eisenbach	0.06	481	0.02	75	556

2013	Alford White Share	White Votes for Candidate	Est. Minority Share	Minority Votes for Candidate	Actual Vote Total
Corado	0.84	6,908	-0.03	(102)	6,806
Tuck	0.17	1,398	1.00	3,846	5,244
Germain	0.80	6,579	0.08	320	6,899
Clerveaux	0.20	1,645	0.89	3,440	5,085
Charles	0.80	6,579	0.07	254	6,833
Forrest	0.20	1,645	0.92	3,530	5,175

35. The following Table 11 shows the vote totals and vote shares by race calculated for each candidate in every Board contest analyzed, using the lower bound for shares of white voter support reported in paragraph 42 of Dr. Alford's report:

Table 11: Votes Totals and Vote Shares by Race Using the Lower Bound for Shares of White Voter Support as reported in para. 42 of Dr. Alford's Report

2017	Alford White Share	White Votes for Candidate	Est. Minority Share	Minority Votes for Candidate	Actual Vote Total
Berkowitz	0.75	7,869	0.35	1,289	9,158
Manigo	0.25	2,623	0.64	2,341	4,964
Grossman	0.75	7,869	0.35	1,268	9,137
Goodwin	0.25	2,623	0.63	2,287	4,910
Freilich	0.77	8,078	0.40	1,452	9,530
Dos Reis	0.23	2,413	0.57	2,090	4,503
2016	**Alford White Share**	**White Votes for Candidate**	**Est. Minority Share**	**Minority Votes for Candidate**	**Actual Vote Total**
Charles	0.74	6,606	0.45	1,367	7,973
Foskew	0.26	2,321	0.55	1,651	3,972
Germain	0.74	6,606	0.41	1,254	7,860
Fields	0.26	2,321	0.60	1,816	4,137
Weissmandl	0.73	6,517	0.37	1,109	7,626
Morales	0.27	2,410	0.66	1,991	4,401

2015	Alford White Share	White Votes for Candidate	Est. Minority Share	Minority Votes for Candidate	Actual Vote Total
Lefkowitz	0.70	5,611	0.22	769	6,380
Charles-Pierre	0.29	2,325	0.66	2,275	4,600
Jones	0.03	240	0.07	228	468
Rothman	0.69	5,493	0.30	1,030	6,523
Morales	0.31	2,468	0.70	2,396	4,864
Ramirez	0.65	5,210	0.31	1,083	6,293
White	0.30	2,405	0.64	2,210	4,615
Eisenbach	0.08	641	-0.02	(85)	556
2013	**Alford White Share**	**White Votes for Candidate**	**Est. Minority Share**	**Minority Votes for Candidate**	**Actual Vote Total**
Corado	0.67	5,510	0.34	1,296	6,806
Tuck	0.33	2,714	0.66	2,530	5,244
Germain	0.67	5,510	0.36	1,389	6,899
Clerveaux	0.33	2,714	0.62	2,371	5,085
Charles	0.66	5,428	0.37	1,405	6,833
Forrest	0.34	2,796	0.62	2,379	5,175

36. The following Figure 1 contains the script that Prof. Collingwood used to generate the turnout estimates rates by race undergirding Dr. Alford's analysis.

Figure 1: Prof. Collingwood Script for Deriving Estimated Turnout Rates by Race from Dr. Alford's EI Analysis

```
##########################################
# East Ramapo Turnout School Board #
##########################################
rm( l i s t=l s ( ) )
library ( eiPack ) ; library ( e i )
library ( t i d y v e r s e )
library ( xt abl e )
library ( haven )
#setwd ( " " ) ; l i s t . f i l e s ( )
################
# Turnout 2017 #
################
cur r entdata <□ as . data . frame( haven : : read_dta ( "Trus tee2017_s e a t o fHops t e in . dta " ) )
cur r entdata$voted <□ with ( cur r entdata , V1 + V2)
cur r entdata$VtdMVap_cor <□ with ( cur r entdata , VtdHVap_cor + VtdBVap_cor + VtdOVap_cor )
# Est imate Turnout
formula1 <□ cbind( voted , novote ) ~ cbind(VtdAVap_cor ,VtdMVap_cor )
set . s e ed (123456)
tune . nocov <□ tuneMD( formula1 , data = cur r entdata , ntunes = 10 , t o t a ldr aws = 100000)
md. out <□ e i .MD. bayes ( formula1 , data = cur r entdata , sample = 100000 , thin = 100 , burnin=100000 , r e t .mcmc=TRUE, tune . l i s t = tune . nocov )
summary(md. out )
# White #
A.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . voted " ]
A.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . novote " ]
A.num. vote . e s t <□ A.num. v1 . e s t+A.num. v2 . e s t
A. shar e . v1 . e s t <□ A.num. v1 . e s t /A.num. vote . e s t
A. shar e . v2 . e s t <□ A.num. v2 . e s t /A.num. vote . e s t
Av1 <□ mean(A. shar e . v1 . e s t )
Av2 <□ mean(A. shar e . v2 . e s t )
# Minori ty #
M.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . voted " ]
M.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . novote " ]
M.num. vote . e s t <□ M.num. v1 . e s t+M.num. v2 . e s t
M. shar e . v1 . e s t <□ M.num. v1 . e s t /M.num. vote . e s t
M. shar e . v2 . e s t <□ M.num. v2 . e s t /M.num. vote . e s t
```

```
Mv1 <□ mean(M. shar e . v1 . e s t )
Mv2 <□ mean(M. shar e . v2 . e s t )
# Pool Turnout
v1v2_2017 <□ c (Av1 , Av2 , Mv1, Mv2)
#######################
# Turnout : 2016 #
#######################
cur r entdata <□ as . data . frame( haven : : read_dta ( "Trus tee2016_seatofWei s smandi . dta " )
)
cur r entdata$voted <□ with ( cur r entdata , V1 + V2)
cur r entdata$VtdMVap_cor <□ with ( cur r entdata , VtdHVap_cor + VtdBVap_cor +
VtdOVap_cor )
# Est imate Turnout
formula1 <□ cbind( voted , novote ) ~ cbind(VtdAVap_cor ,VtdMVap_cor )
set . s e ed (123456)
tune . nocov <□ tuneMD( formula1 , data = cur r entdata , ntunes = 10 , t o t a ldr aws = 100000)
md. out <□ e i .MD. bayes ( formula1 , data = cur r entdata , sample = 100000 , thin = 100 ,
burnin=100000 , r e t .mcmc=TRUE, tune . l i s t = tune . nocov )
summary(md. out )
# White #
A.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . voted " ]
A.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . novote " ]
A.num. vote . e s t <□ A.num. v1 . e s t+A.num. v2 . e s t
A. shar e . v1 . e s t <□ A.num. v1 . e s t /A.num. vote . e s t
A. shar e . v2 . e s t <□ A.num. v2 . e s t /A.num.
Av1 <□ mean(A. shar e . v1 . e s t )
Av2 <□ mean(A. shar e . v2 . e s t )

# Minori ty #
M.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . voted " ]
M.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . novote " ]
M.num. vote . e s t <□ M.num. v1 . e s t+M.num. v2 . e s t
M. shar e . v1 . e s t <□ M.num. v1 . e s t /M.num. vote . e s t
M. shar e . v2 . e s t <□ M.num. v2 . e s t /M.num. vote . e s t
Mv1 <□ mean(M. shar e . v1 . e s t )
Mv2 <□ mean(M. shar e . v2 . e s t )
# Pool Turnout :
v1v2_2016 <□ c (Av1 , Av2 , Mv1, Mv2)
#######################
# Turnout : 2015 #
#######################
cur r entdata <□ as . data . frame( haven : : read_dta ( "Trus tee2015_seatofRothman . dta " ) )
cur r entdata$voted <□ with ( cur r entdata , V1 + V2)
cur r entdata$VtdMVap_cor <□ with ( cur r entdata , VtdHVap_cor + VtdBVap_cor +
VtdOVap_cor )
#Est imate Turnout
```

```
formula1 <□ cbind( voted , novote ) ~ cbind(VtdAVap_cor ,VtdMVap_cor )
set . s e ed (123456)
tune . nocov <□ tuneMD( formula1 , data = cur r entdata , ntunes = 10 , t o t a ldr aws = 100000)
md. out <□ e i .MD. bayes ( formula1 , data = cur r entdata , sample = 100000 , thin = 100 ,
burnin=100000 , r e t .mcmc=TRUE, tune . l i s t = tune . nocov )
summary(md. out )
# White #
A.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . voted " ]
A.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . novote " ]
A.num. vote . e s t <□ A.num. v1 . e s t+A.num. v2 . e s t
A. shar e . v1 . e s t <□ A.num. v1 . e s t /A.num. vote . e s t
A. shar e . v2 . e s t <□ A.num. v2 . e s t /A.num. vote . e s t
Av1 <□ mean(A. shar e . v1 . e s t ) ; Av1
Av2 <□ mean(A. shar e . v2 . e s t ) ; Av2
# Minori ty #
M.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . voted " ]
M.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . novote " ]
M.num. vote . e s t <□ M.num. v1 . e s t+M.num. v2 . e s t
M. shar e . v1 . e s t <□ M.num. v1 . e s t /M.num. vote . e s t
M. shar e . v2 . e s t <□ M.num. v2 . e s t /M.num. vote . e s t
Mv1 <□ mean(M. shar e . v1 . e s t ) ; Mv1
Mv2 <□ mean(M. shar e . v2 . e s t ) ; Mv2
# Pool Turnout :
v1v2_2015 <□ c (Av1 , Av2 , Mv1, Mv2)
########################
# Turnout : 2013 #
########################
cur r entdata <□ as . data . frame( haven : : read_dta ( "Trus tee2013_seatofLosman . dta " ) )
cur r entdata$voted <□ with ( cur r entdata , V1 + V2)
cur r entdata$VtdMVap_cor <□ with ( cur r entdata , VtdHVap_cor + VtdBVap_cor +
VtdOVap_cor )
# Est imate Turnout
formula1 <□ cbind( voted , novote ) ~ cbind(VtdAVap_cor ,VtdMVap_cor )
set . s e ed (123456)
tune . nocov <□ tuneMD( formula1 , data = cur r entdata , ntunes = 10 , t o t a ldr aws = 100000)
md. out <□ e i .MD. bayes ( formula1 , data = cur r entdata , sample = 100000 , thin = 100 ,
burnin=100000 , r e t .mcmc=TRUE, tune . l i s t = tune . nocov )
summary(md. out )
# White #
A.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . voted " ]
A.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdAVap_cor . novote " ]
A.num. vote . e s t <□ A.num. v1 . e s t+A.num. v2 . e s t
A. shar e . v1 . e s t <□ A.num. v1 . e s t /A.num. vote . e s t
A. shar e . v2 . e s t <□ A.num. v2 . e s t /A.num. vote . e s t
Av1 <□ mean(A. shar e . v1 . e s t ) ; Av1
```

```
Av2 <□ mean(A. shar e . v2 . e s t ) ; Av2
# Minori ty #
M.num. v1 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . voted " ]
M.num. v2 . e s t <□ md. out$draws$Ce l l . count s [ , " ccount .VtdMVap_cor . novote " ]
M.num. vote . e s t <□ M.num. v1 . e s t+M.num. v2 . e s t
M. shar e . v1 . e s t <□ M.num. v1 . e s t /M.num. vote . e s t
M. shar e . v2 . e s t <□ M.num. v2 . e s t /M.num. vote . e s t
Mv1 <□ mean(M. shar e . v1 . e s t ) ; Mv1
Mv2 <□ mean(M. shar e . v2 . e s t ) ; Mv2
# Pool Turnout : White Vote , whi t e no vote , minor i ty vote , minor i ty no vot e
v1v2_2013 <□ c (Av1 , Av2 , Mv1, Mv2 ) ; v1v2_2013
##################################
# Combine Turnout Across Years #
##################################
to_tab <□ cbind( v1v2_2017 , v1v2_2016 , v1v2_2015 , v1v2_2013)
rownames( to_tab ) <□ c ( "Pct .  White Turnout" , "Pct .  White No Vote" ,
"Pct .  Minor i ty  Turnout" , "Pct .  White No Vote" )
colnames ( to_tab ) <□ c ( " 2017 " , " 2016 " , " 2015 " , " 2013 " )
to_tab
```

Wherefore, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Steven P. Cole

Dr. Steven P. Cole

Sworn to before me in WESTCHESTER COUNTY, New York on this 28 day of MARCH, 2018

Notary Public

STEVEN J PIRROTTA
Notary Public – State of New York
NO. 01PI6368328
Qualified in Westchester County
My Commission Expires Dec 11, 2021